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Exploring the Prevalence of Constipation in Diabetic Individuals in Qassim Region, Saudi Arabia 2024

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ABSTRACT

Introduction: Constipation is prevalent worldwide (6.6%-10.1%). Its association with diabetes mellitus (DM) is clear; it affects the quality of life, and diabetic complications could potentially worsen. Although recognized, data on the prevalence of constipation in diabetic populations is lacking. Especially regionally, is scarce. This study aims to fill this gap and provide insights for targeted interventions to enhance management. *Material and Methods:* The study employed a cross-sectional design. Participants were recruited from diverse healthcare establishments across urban and rural regions. Data collection involved two parts of questionnaires: One structured questionnaire, and the other gastrointestinal Quality of Life Index (GIQLI), analyzed using the SPSS program. *Results:* This study included 289 diabetic patients in Saudi Arabia's Qassim region. Constipation was prevalent in 30.4% of participants. Type 2 diabetes was more prevalent (93.8%), with an average duration of 18.81 years and a mean HbA1c level of 7.47%. Constipated patients reported significantly lower gastrointestinal Quality of Life Index (GIQLI) scores (65.8) compared to non-constipated individuals (87.2). Multiple logistic regression analysis identified advanced age as slightly decreasing the risk of constipation at, the same time, longer diabetes duration, presence of coronary heart disease, insulin therapy, and lower GIQLI scores were significant independent risk factors for constipation symptoms. *Conclusion:* Constipation symptoms were prevalent in nearly one-third of diabetic patients. Independent risk factors, including advanced age, longer diabetes duration, presence of coronary heart disease, insulin therapy, and lower gastrointestinal quality of life scores, emphasize the necessity for targeted strategies to manage constipation in diabetic populations.

Keywords: Constipation prevalence, diabetes mellitus, gastrointestinal quality of life, risk factors

1. INTRODUCTION

Constipation is a common gastrointestinal complaint affecting individuals worldwide, with a prevalence ranging from 6.6% to 10.1% in various populations (Barberio et al., 2021). It is defined by rare bowel movements, challenges in passing stools, and the passage of hard stools (Jani et al., 2018). While constipation can occur in isolation, its association with diabetes mellitus (DM) has garnered significant attention due to its impact on the quality of life and potential worsening of diabetic complications (Ito et al., 2022). Diabetes mellitus, a chronic disease characterized by high blood sugar levels, affects over 463 million individuals globally in 2019 and is projected to rise in prevalence (Saeedi et al., 2019).

The relationship between diabetes and constipation has been suggested in previous studies, indicating that diabetic individuals are more likely to experience constipation compared to the general population (Piper and Saad, 2017). Several mechanisms have been proposed to explain this connection, including autonomic neuropathy, altered gut motility, and medication side effects (Yarandi and Srinivasan, 2014). The prevalence of constipation in diabetic individuals varies across different geographic regions and populations, highlighting the importance of considering regional factors in understanding disease burden and management approaches. In the Qassim region of Saudi Arabia, cultural and dietary practices, as well as genetic predispositions, may affect the prevalence and severity of constipation in diabetic individuals (Alhassan et al., 2019).

Limited access to healthcare services and cultural stigmas surrounding gastrointestinal symptoms may also contribute to underreporting and under treatment of constipation in this population (Alshareef et al., 2024). Despite the increasing recognition of the connection between diabetes and constipation, there is a lack of data on the prevalence of constipation, specifically in diabetic individuals, particularly in specific geographic regions. The Qassim region, located in the heart of Saudi Arabia, represents a unique population with it is cultural and lifestyle factors that may influence the prevalence of constipation in diabetic individuals. Thus, this study aims to explore the prevalence of constipation in diabetic individuals residing in the Qassim region, shedding light on the burden of this gastrointestinal complication in this population and informing targeted interventions to improve management and quality of life.

2. MATERIAL AND METHODS

The research employed a cross-sectional study design to investigate the prevalence of constipation among diabetic individuals aged 18 years and above residing in the Qassim region. Participants were recruited from diverse sources, including outpatient clinics and diabetes centers, and community health centers in both urban and rural areas. This study was conducted during the period between May 2024 to July 2024.

Inclusion criteria encompassed adults aged eighteen years and older with a confirmed diagnosis of diabetes mellitus (type 1 or type 2) as documented in their medical records and who had been residents of the Qassim region for at least six months. Criteria for exclusion were defined to exclude individuals with factors potentially impacting bowel function, such as a history of gastrointestinal surgery, severe cognitive impairment, psychiatric disorders affecting communication and cooperation, pregnancy, breastfeeding, or chronic conditions other than diabetes that could affect bowel function (e.g., inflammatory bowel disease, colon cancer).

Sampling and Data Collection

The sample size for the study was estimated using the formula n= Z2×p×(1−p)/d2, where Z=1.96 (for a confidence level of 95%), p=0.25 (assuming an estimated prevalence of constipation among diabetic individuals of 25%), and d=0.05 (assuming a margin of error of 5%) for estimating proportions in cross-sectional studies. Data collection was conducted through the administration of two questionnaires. The first questionnaire, translated into Arabic, comprised two sections. The first section gathered demographic information, including age, gender, occupation, and education level, while the second section focused on bowel habits and diabetes-related questions. The second questionnaire utilized was the GIQLI, a validated instrument was utilized Quality of Life (QoL) pertaining of digestive disorders. The GIQLI consisted of 36 questions covering socio-demographic details and five dimensions or sub-scales: Symptoms, Vitality, Emotions, Social relations, and Effects of medical or possible surgical treatment.

Each question was graded on a scale from 0 to 4, representing the most negative (0) to the most optimistic (4) appraisal, with a total score ideally summing up to 144. Data collection was collected anonymously, either in person or electronically, to ensure participant

confidentiality. Using IBM SPSS, version 27.0 for the data collected and analyzed. Qualitative variables were presented as occurrences and proportions and analyzed using the Chi-square test. Quantitative variables were expressed as mean and standard deviation (SD) and compared by independent sample t-test and Mann-Whitney U-test. Normality was assessed by skewness, kurtosis, Q-Q plots, and the Shapiro-Wilk test. Multiple logistic regression analysis was used to identify independent risk factors for constipation among diabetic individuals. For multivariate analysis, variables for which univariate analyses showed $p<0.05$ were included. The findings were depicted in the form of bar charts where possible for more straightforward interpretation. The significance level was established at 5%, with p-values less than 0.05 (at a 95% confidence interval) considered statistically significant.

Ethical Considerations

The research was approved by the Regional Research Ethics Committee, Qassim province (Ethical approval code, NCBE registration No: H-04-Q-001).

All participants were given the detailed information about the study, and they were given informed consent before their involvement. Measures were collected to ensure confidentiality, minimize harm, and promote goodwill throughout the study. Participant selection was fair and transparent, with no discrimination.

3. RESULTS

The study included 289 diabetic patients with a mean age of 56.1 ± 18.86 years (range: 20-85 years), predominantly comprising females (187, 64.7%). Constipation was noted in 88 (30.4%) diabetic patients (Figure 1). Type 2 diabetes was more prevalent (271, 93.8%), with an average duration of 18.81 ± 13.03 years. The mean HbA1c level was 7.47% ± 0.81, and the mean (GIQLI) score was 80.7 ± 24.97 (Table 1).

Table 2 presents a comparative analysis of diabetic patients with and without constipation symptoms. Among the 289 participants, 88 (30.4%) reported constipation. Significant disparities were noted in various demographic and clinical parameters between constipated and non-constipated patients. Notably, constipated patients tended to be older (61.1 ± 16.59 vs. 53.9 ± 19.41 years, $p = 0.006$), had a longer duration of diabetes (21.6 ± 14.04 vs. 17.6 ± 12.40 years, $p = 0.011$), higher prevalence of diabetic neuropathy (43.2% vs. 22.9%, $p < 0.001$), coronary heart disease (25.0% vs. 13.9%, $p = 0.022$), and were more likely to be on insulin therapy (55.7% vs. 34.8%, $p < 0.001$). Additionally, constipated patients showed a significantly lower GIQLI score (65.8 ± 21.06 vs. 87.2 ± 23.78, $p < 0.001$).

Table 3 outlines the multiple logistic regression analysis yielded findings on independent risk factors associated with constipation symptoms in diabetic patients. Advanced age (OR: 0.79, 95% CI: 0.73–0.86, $p < 0.001$) was associated with a slightly decreased risk of constipation, while a longer duration of diabetes (OR: 1.12, 95% CI: 1.03–1.22, $p = 0.008$), presence of coronary heart disease (OR: 21.4, 95% CI: 2.56–178.4, $p = 0.005$), insulin therapy (OR: 24.6, 95% CI: 4.96–121.4, $p < 0.001$), and lower GIQLI scores (OR: 1.03, 95% CI: 1.02–1.05, $p < 0.001$) were discovered as significant independent risk factors for constipation symptoms.

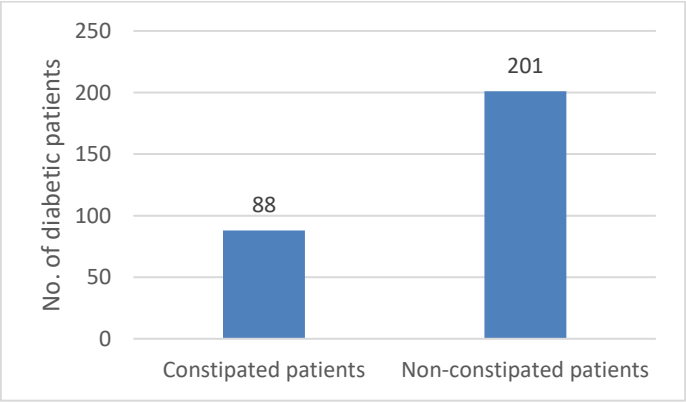

Figure 1 Distribution of diabetic patients based on constipation.

Table 1 Clinical and demographic characteristics of study participants

Clinical and Demographic Characteristics	n	%
General Demographics		
Gender		
Female	187	64.7%
Male	102	35.3%
Age (years), Mean ± SD	56.1 ± 18.86	
BMI (kg/m2), Mean ± SD	25.5 ± 4.77	
Current smokers	51	17.6%
Alcohol drinkers	57	19.7%
Exercise (≥ 20 min)	137	47.4%
Constipation	88	30.4%
Hypertension	163	56.4%
Systolic blood pressure (mmHg), Mean ± SD	140.8 ± 11.7	
Diastolic blood pressure (mmHg), Mean ± SD	91.4 ± 9.7	
Diabetes status		
Type of diabetes		
Type 1	18	6.2%
Type 2	271	93.8%
Duration of diabetes (years), Mean ± SD	18.8 ± 13.03	
Diabetic retinopathy	96	33.2%
Diabetic neuropathy	84	29.1%
Diabetic nephropathy	76	26.3%
Cerebrovascular disease	42	14.5%
Coronary heart disease	50	17.3%
Peripheral arterial disease	16	5.5%
Biochemistry		
HbA1c (%), Mean ± SD	7.47 ± 0.81	
LDL-cholesterol (mg/dL), Mean ± SD	102.5 ± 15.50	
HDL-cholesterol (mg/dL), Mean ± SD	57.04 ± 8.95	
Non-HDL-cholesterol (mg/dL), Mean ± SD	116.9 ± 9.74	
Anti-diabetic drugs		
Metformin	148	51.2%
Sulfonylurea	77	26.6%
Dipeptidyl peptidase-4 inhibitor	144	49.8%
Alpha-glucosidase inhibitor	32	11.1%
Thiazolidinedione	18	6.2%
Sodium-glucose cotransporter 2 inhibitor	36	12.5%
GLP-1 receptor agonists	21	7.3%
Insulin	119	41.2%
Gastrointestinal Quality of Life Index (GIQLI)	80.7 ± 24.97	

Table 2 Comparison of clinical and demographic characteristics in diabetic patients with and without constipation

Clinical and Demographic Characteristics	Constipated patients (n=88)	Non-constipated patients (n=201)	p-value
	n (%)	n (%)	
General Demographics			
Gender			
Female	64 (72.7%)	123 (61.2%)	0.059
Male	24 (27.3%)	78 (38.8%)	
Age (years), Mean ± SD	61.1 ± 16.59	53.9 ± 19.41	0.006*
BMI (kg/m2), Mean ± SD	25.6 ± 4.61	25.4 ± 4.85	0.628
Current smokers	14 (15.9%)	37 (18.4%)	0.608
Alcohol drinkers	15 (17.0%)	42 (20.9%)	0.449
Exercise (≥ 20 min)	46 (52.3%)	91 (45.3%)	0.273
Hypertension	51 (58.0%)	112 (55.7%)	0.725
Systolic blood pressure (mmHg), Mean ± SD	140.7 ± 11.4	140.8 ± 11.9	0.923
Diastolic blood pressure (mmHg), Mean ± SD	89.9 ± 7.3	92.1 ± 10.5	0.126
Diabetes status			
Type of diabetes			
Type 1	6 (6.8%)	12 (6.0%)	0.784
Type 2	82 (93.2%)	189 (94.0%)	
Duration of diabetes (years), Mean ± SD	21.6 ± 14.04	17.6 ± 12.40	0.011*
Diabetic retinopathy	36 (40.9%)	60 (29.9%)	0.066
Diabetic neuropathy	38 (43.2%)	46 (22.9%)	< 0.001*
Diabetic nephropathy	24 (27.3%)	52 (25.9%)	0.803
Cerebrovascular disease	14 (15.9%)	28 (13.9%)	0.660
Coronary heart disease	22 (25.0%)	28 (13.9%)	0.022*
Peripheral arterial disease	5 (5.7%)	11 (5.5%)	1.000
Biochemistry			
HbA1c (%), Mean ± SD	7.58 ± 0.82	7.42 ± 0.80	0.161
LDL-cholesterol (mg/dL), Mean ± SD	104.1 ± 14.49	101.8 ± 15.90	0.460
HDL-cholesterol (mg/dL), Mean ± SD	57.3 ± 9.20	56.9 ± 8.86	0.589
Non-HDL-cholesterol (mg/dL), Mean ± SD	116.7 ± 9.67	116.9 ± 9.79	0.859
Anti-diabetic drugs			
Metformin	43 (48.9%)	105 (52.2%)	0.597
Sulfonylurea	21 (23.9%)	56 (27.9%)	0.479
Dipeptidyl peptidase-4 inhibitor	42 (47.7%)	102 (50.7%)	0.637
Alpha-glucosidase inhibitor	9 (10.2%)	23 (11.4%)	0.762
Thiazolidinedione	5 (5.7%)	13 (6.5%)	0.799
Sodium-glucose cotransporter 2 inhibitor	10 (11.4%)	26 (12.9%)	0.710
GLP-1 receptor agonists	7 (8.0%)	14 (7.0%)	0.766
Insulin	49 (55.7%)	70 (34.8%)	< 0.001*
*p < 0.05			

Table 3 The multiple logistic regression analysis yielded findings on independent risk factors associated with constipation symptoms in diabetic patients

Independent Risk Factors	Odds ratio	95% CI	p-value
Age (years)	0.79	0.73 – 0.86	< 0.001
Duration of diabetes (years)	1.12	1.03 – 1.22	0.008
Diabetic neuropathy	6.47	0.80 – 52.3	0.08
Coronary heart disease	21.4	2.56 – 178.4	0.005
Insulin	24.6	4.96 – 121.4	< 0.001
Gastrointestinal Quality of Life Index	1.03	1.02 – 1.05	<0.001

4. DISCUSSION

Our study explores the correlation between diabetes and constipation among diabetic patients in the Qassim Region. This study found that 30.4% of diabetic patients experienced constipation. This aligns with other research indicating that constipation is a common complication in diabetes, affecting up to 60% of individuals with long-standing diabetes (Maisey, 2016). With 93.8% of the study participants having Type 2 diabetes, the data reflects the global trend where Type 2 diabetes is more prevalent than Type 1, particularly in adult populations (Lin et al., 2020; Reed et al., 2021). A longer duration of diabetes was associated with reports from patients experiencing more constipation, which is consistent with findings that persistent elevated blood glucose levels may lead to complications, such as diabetic neuropathy, affecting gastrointestinal motility (Azpiroz and Malagelada, 2016; Giri et al., 2018).

The study noted a higher prevalence of diabetic neuropathy in constipated patients is substantiated by literature stating that diabetes can cause nerve damage, leading to gastrointestinal issues such as constipation (Azpiroz and Malagelada, 2016). The association between constipation and coronary heart disease in diabetic patients may be due to shared risk factors such as inadequate glycemic control and a sedentary lifestyle, which can affect to both conditions (Wu et al., 2021). The finding that insulin therapy is a risk factor for constipation could be related to the fact that insulin can alter gut motility and fluid balance, leading to constipation (Zhao et al., 2021; Forgacs and Patel, 2011). Lower gastrointestinal Quality of Life Index scores in constipated patients indicate a significant impact on quality of life. This is a crucial aspect of managing chronic conditions like diabetes (Silva et al., 2018).

Interestingly, advanced age was associated with a slightly decreased risk of constipation. This may be because older individuals are more inclined to adjust their lifestyle to effectively manage their diabetes, potentially through dietary and exercise habits, which could reduce the risk of constipation (Celli et al., 2022). Study findings hold clinical implications for healthcare providers in the region and beyond. Clinicians need to be vigilant in screening diabetic patients, especially those who are older, have had diabetes for a longer duration, or are managing coronary heart disease for symptoms of constipation (Chopra and Peter, 2012). Early identification and management of constipation can help enhance the overall well-being for DM patient individuals and potentially prevent complications associated with chronic constipation, such as fecal impaction or bowel obstruction (Rao and Go, 2010).

Further exploration and consideration are needed regarding the link between insulin therapy and constipation in strategies for managing diabetes. Healthcare providers should assess and monitor gastrointestinal symptoms in patients on insulin therapy, and adjustments to treatment plans may be necessary to mitigate the risk of constipation (Prasad and Abraham, 2017). Interventions aimed at improving gastrointestinal quality of life, such as dietary modifications, increased physical activity, and targeted therapies, may benefit diabetic patients, particularly those at higher risk for constipation. Collaborative efforts between healthcare providers, including endocrinologists, gastroenterologists, and primary care physicians, are essential in developing comprehensive care plans for diabetes management and gastrointestinal health.

Limitations

His study has several limitations that need to be recognized. The cross-sectional design hinders our ability to establish a causal relationship between diabetes and constipation or identify temporal relationships between variables. The study was executed in a particular geographic area, the Qassim region of Saudi Arabia, which could restrict the applicability of the results to diverse populations with varying demographics, cultural, and environmental factors. Data collection relied on self-reported symptoms and

medical history, which introduces the possibility of recall bias and may underestimate the true prevalence of constipation or misclassify certain clinical variables.

Future Research and Recommendations

Future research in this area could delve deeper into understanding why constipation is prevalent among individuals with diabetes. Studies could track changes in constipation over time in diabetic groups to see how the condition progresses and what treatments work best. Researchers could also look into how lifestyle factors, like diet and exercise, affect constipation in diabetic individuals in places like the Qassim region. It would be helpful for doctors from different specialties to work together to create care plans that address diabetes and constipation.

Doctors should regularly screen for constipation in diabetic patients, particularly in older individuals with long-standing diabetes, those with heart disease, and those receiving insulin therapy. Educating both patients and healthcare providers about constipation and its management is essential. Also, setting up collaboration between diabetes and gastroenterology clinics can ensure that patients get comprehensive care. Policymakers should support research and initiatives that aim to improve how constipation is understood and treated in people with diabetes within the healthcare system.

5. CONCLUSION

Nearly one-third of diabetic patients experienced symptoms of constipation. The identification of independent risk factors such as advanced age, longer duration of diabetes, presence of coronary heart disease, insulin therapy, and lower gastrointestinal quality of life scores underscores the need for tailored interventions to address constipation in diabetic populations. Clinicians should prioritize the management of constipation symptoms to enhance the overall quality of life and prevent potential complications associated with this condition.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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